MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2018/2019

PMT0101 – MATHEMATICS I

(Foundation in Information Technology)

15 MARCH 2019
9.00 a.m. – 11 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 5 pages with **FIVE** questions.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided.
4. **No calculators are allowed**.
5. **You are required to write all relevant steps** to obtain maximum marks.

No Calculators are allowed.
You are required to write proper steps.

QUESTION 1 [10 marks]

a) Simplify the following expression and write your final expression as a fraction with no negative exponents. Assume all variables have positive values.
Show proper steps.

$$\frac{8a^2b^4}{(abc^2)^2}\cdot\frac{3(b^3c^2)^3}{16a^4bc}$$

[2 marks]

b) Simplify the radicals and write the final answer as single term.

[2 marks]

$$5\sqrt{18}+2\sqrt{162}$$

c) Simplify the following expression.

$$\frac{x^2+2x-15}{(x-1)^2}\cdot\frac{2x^2+x-3}{(x-3)(2x+3)^2}$$

[3 marks]

d) Given $z_1=1+3i$ and $z_2=2-i$.

Express the following in the form $a+bi$, where a and b are real numbers.

$$\frac{z_1+z_2}{z_2}$$

[3 marks]

Continued...

QUESTION 2 [10 marks]

a) Solve the equation: $\frac{16-4x}{5}=12x.$ [2 marks]

b) Solve the equation: $3x^4-28x^2+9=0.$
(Hint: Use substitution, $u=x^2$) [3 marks]

c) Solve the inequality $\frac{2x-7}{(x+1)(x-2)}>0.$

Show clearly your Sign Diagram and give your final answer in interval notation.

[3 marks]

d) Solve the inequality: $|3x+5|>10.$ [2 marks]

Continued...

QUESTION 3 [10 marks]

a) Given a function $f(x)=\frac{12}{x+b}$.

i) If $f(4)=-3$, find the value of b.

ii) State the domain of f. Write your answer in interval notation.

iii) Find x such that $f(x)=-x$. [5 marks]

b) A piecewise function f is defined as $f(x)=\begin{cases} x^2+1, & x\leq 0 \\ -x^2-1, & x>0 \end{cases}$

i) Find the values of $f(-2)$, $f(0)$ and $f(3)$.

ii) Sketch the function f. Show any 2 points for each curve.

iii) Determine the domain of f.
Write your answer in interval notation.

[5 marks]

Continued...

QUESTION 4 [10 marks]

a) Use remainder theorem to find **the remainder** when the function $f(x)=3x^3-5x^2+10x-3$ is divided by $g(x)=x+1$.

[2 marks]

b) Solve the equation: $\log_{10}(19x^2+4)=2\log_{10}x+2, \quad x>0.$

[3 marks]

c) Given the polynomial function $f(x)=(x-1)^5(x+3)^2$.

i) What is the **degree** of f?

ii) Determine **the zeros** of f **and their multiplicities**.
Also, determine whether the graph of f crosses or touches the x-axis at each zero.

iii) Determine its y-intercept.

iv) Determine the end behavior of f.

v) Sketch the graph of the polynomial function.
Make sure your graph shows all intercepts and exhibits the proper end behaviour.

[5 marks]

Continued...

QUESTION 5 [10 marks]

a) Find an equation of a straight line that passes through point $(4,-1)$ and is parallel to the line $2x-3y=9$.

[2 marks]

b) Given an equation of a circle $x^2+y^2+3x+6y+9=0$.

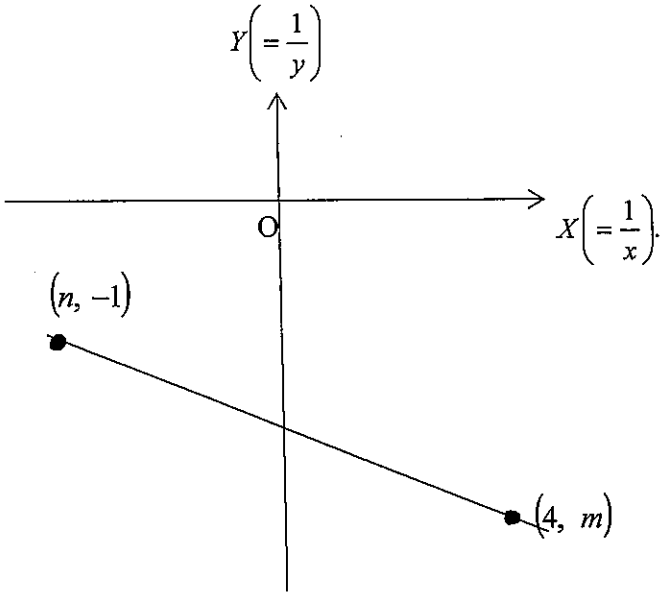
i) Express the equation in the form $(x-h)^2+(y-k)^2=r^2$ where h, k and r are constants.

ii) Find the centre and radius of the circle.

iii) Find the y-intercepts of the circles. [4 marks]

c) Two variables x and y are related by an equation $y=\dfrac{-4x}{1+8x}$.

The diagram below shows a straight line obtained by plotting $Y\left(=\dfrac{1}{y}\right)$ against $X\left(=\dfrac{1}{x}\right)$.



The line passes through points $(n, -1)$ and $(4, m)$.

i) Find the X and Y intercepts of the line.

ii) Find the values of m and n.

[4 marks]

End of Page.